

AMENDMENTS TO THE CLAIMS:

1. (Currently Amended) A fine granularity scalable encoder comprising:

a base-layer encoding block including a coarse prediction loop and a base-layer mode selector, said coarse prediction loop having a coarse prediction output;

an enhancement-layer encoding block including a fine prediction loop and an enhancement-layer mode selector, said fine prediction loop having a fine prediction output; and

a mode decision unit for adaptively controlling said enhancement-layer and base-layer mode selectors;

wherein said encoder operates in a mix prediction mode when said base-layer mode selector is switched to select said coarse prediction output and said enhancement-layer mode selector is switched to select said fine prediction output, [[and]] said encoder operates in an all-coarse prediction mode when both said base-layer mode selector and said enhancement-layer mode selector [[is]] are switched to select said coarse prediction output, and said encoder operates in an all-fine prediction mode when both said base-layer mode selector and said enhancement-layer mode selector are switched to select said fine prediction output.

- 2-3 (Cancelled).

4. (Currently Amended) The fine granularity scalable encoder as claimed in claim [[3]] 1, said mode decision unit further comprising a mismatch estimation unit for estimating mismatch errors between said said coarse prediction output and said fine prediction

output.

5. (Original) The fine granularity scalable encoder as claimed in claim 4, further comprising a worst-case base-layer decoder for providing a worst-case coarse prediction output to said mismatch estimation unit.

6-7. (Cancelled).

8. (Currently Amended) An encoding method having at least two coding modes, said method comprising the steps of:

- (a) collecting encoding parameters from each macroblock of a plurality of macroblocks of input signals;
- (b) analyzing said encoding parameters to determine a coding mode for each macroblock; and
- (c) encoding each macroblock according to the coding mode determined in said step (b);

wherein said encoding method includes a base layer with coarse prediction and an enhancement layer with fine prediction, and encoding parameters collected from each macroblock in said step (a) include a fine prediction error value, a coarse prediction error value, and best-case and worst-case mismatch errors in fine prediction.

9. (Original) The encoding method as claimed in claim 8, wherein said plurality of macroblocks are classified in said step (b) into at least two coding groups and each macroblock in a coding group is assigned with a same coding mode.
10. (Original) The encoding method as claimed in claim 8, wherein said encoding

method has an all-coarse prediction mode, an all-fine prediction mode, and a mix prediction mode, and said plurality of macroblocks are classified in said step (b) into an all-coarse prediction group in which each macroblock is assigned with said all-coarse prediction mode, an all-fine prediction group in which each macroblock is assigned with said all-fine prediction mode and a mix prediction group in which each macroblock is assigned with said mix prediction mode.

11. (Cancelled).

12. (Currently Amended) The encoding method as claimed in claim [[11]] 8, wherein said encoding method has an all-coarse prediction mode, an all-fine prediction mode, and a mix prediction mode, and said plurality of macroblocks are classified in said step (b) into an all-coarse prediction group in which each macroblock is assigned with said all-coarse prediction mode, an all-fine prediction group in which each macroblock is assigned with said all-fine prediction mode and a mix prediction group in which each macroblock is assigned with said mix prediction mode.

13. (Currently Amended) The encoding method as claimed in claim [[11]] 8, wherein said plurality of macroblocks are classified into at least two coding groups according to a coding gain derived from said fine and coarse prediction error values of each macroblock and a predicted mismatch error derived from said best-case and worst-case mismatch errors of each macroblock.

14. (Original) The encoding method as claimed in claim 13, wherein said encoding method has an all-coarse prediction mode, an all-fine prediction mode, and a mix prediction mode, and said plurality of macroblocks are classified in said step (b) into

an all-coarse prediction group in which each macroblock is assigned with said all-coarse prediction mode, an all-fine prediction group in which each macroblock is assigned with said all-fine prediction mode and a mix prediction group in which each macroblock is assigned with said mix prediction mode.

15. (Original) The encoding method as claimed in claim 14, wherein the coding gain of a given macroblock divided by the predicted mismatch error of the given macroblock is defined as the coding efficiency of the given macroblock, and the given macroblock is then assigned with one of said all-coarse prediction mode, said all-fine prediction mode and said mix prediction mode according to the coding efficiency of the given macroblock.
16. (Original) The encoding method as claimed in claim 15, wherein a coding efficiency mean and a coding efficiency standard deviation are computed from the coding efficiencies of said plurality of macroblocks, and the given macroblock is assigned with one of said all-coarse prediction mode, said all-fine prediction mode and said mix prediction mode by comparing the coding efficiency of the given macroblock to values determined by said coding efficiency mean and said coding efficiency standard deviation.
17. (Original) The encoding method as claimed in claim 16, wherein the given macroblock is assigned with said all-coarse prediction mode if the coding efficiency of the given macroblock is smaller than the difference of said coding efficiency mean and a pre-determined multiple of said coding efficiency standard deviation, the given macroblock is assigned with said all-fine prediction mode if the coding efficiency of

the given macroblock is larger than the sum of said coding efficiency mean and a pre-determined multiple of said coding efficiency standard deviation, and otherwise the given macroblock is assigned with said mix prediction mode.

18. (Currently Amended) A method for truncating bit-planes in an enhancement layer of a group of pictures for allocating bits sent to a client channel, comprising the steps of:

- (a) performing low-rate bit truncation if total bits available for allocation for said enhancement layer are less than or equal to total number of enhancement-layer bits in all I/P-frames in said group of pictures used for fine prediction;
- (b) performing medium-rate bit truncation if total bits available for allocation for said enhancement layer are less than or equal to total number of enhancement-layer bits in said group of pictures used for fine prediction but greater than total number of enhancement-layer bits in all I/P-frames in said group of pictures used for fine prediction; and
- (c) performing high-rate bit truncation if total bits available for allocation for said enhancement layer are greater than total number of enhancement-layer bits in said group of pictures used for fine prediction;

wherein said low-rate bit truncation allocates each I/P-frames of said enhancement layer with a number of bits proportional to a ratio of the number of bits used for prediction in each I/P-frames to total number of bits used for fine prediction for all I/P-frames in said group of pictures, and allocates no bit to any B-frame of said enhancement layer.

19. (Cancelled).
20. (Currently Amended) The method for truncating bit-planes in an enhancement layer of a group of pictures for allocating bits sent to a client channel as claimed in claim [[19]] 18, wherein said medium-rate bit truncation allocates each I/P-frames of said enhancement layer with a number of bits equal to the number of bits used for fine prediction in each I/P-frames, and allocates each B-frame of said enhancement layer with a number of bits proportional to a ratio of the number of enhancement-layer most significant bits used for fine prediction in each B-frame to total number of enhancement-layer most significant bits used for fine prediction for all B-frames in said group of pictures.
21. (Original) The method for truncating bit-planes in an enhancement layer of a group of pictures for allocating bits sent to a client channel as claimed in claim 20, wherein said high-rate bit truncation allocates each I/P-frames of said enhancement layer with a number of bits equal to the number of bits used for fine prediction in each I/P frames plus a number of bits proportional to a ratio of the number of bits used for fine prediction in each I/P-frames to the summation of total number of bits used for fine prediction for all I/P-frames in said group of pictures and total number of enhancement-layer most significant bits used for fine prediction for all B-frames in said group of pictures, and allocates each B-frame of said enhancement layer with a number of bits proportional to a ratio of the number of enhancement-layer most significant bits used for fine prediction in each B-frame to the summation of total number of bits used for fine prediction for all I/P-frames in said group of pictures and

total number of enhancement-layer most significant bits used for fine prediction for all B-frames in said group of pictures.

22. (Original) The method for truncating bit-planes in an enhancement layer of a group of pictures for allocating bits sent to a client channel as claimed in claim 21, wherein said medium-rate bit truncation allocates each I/P-frames of said enhancement layer with a number of bits equal to the number of bits used for fine prediction in each I/P-frames, and allocates each B-frame of said enhancement layer with a number of bits proportional to a ratio of the number of enhancement-layer most significant bits used for fine prediction in each B-frame to total number of enhancement-layer most significant bits used for fine prediction for all B-frames in said group of pictures.
23. (Currently Amended) [[The]] A method for truncating bit-planes in an enhancement layer of a group of pictures for allocating bits sent to a client channel as claimed in claim 18, comprising the steps of:
- (a) performing low-rate bit truncation if total bits available for allocation for said enhancement layer are less than or equal to total number of enhancement-layer bits in all I/P-frames in said group of pictures used for fine prediction;
 - (b) performing medium-rate bit truncation if total bits available for allocation for said enhancement layer are less than or equal to total number of enhancement-layer bits in said group of pictures used for fine prediction but greater than total number of enhancement-layer bits in all I/P-frames in said group of pictures used for fine prediction; and

(c) performing high-rate bit truncation if total bits available for allocation for said enhancement layer are greater than total number of enhancement-layer bits in said group of pictures used for fine prediction;

wherein said high-rate bit truncation allocates each I/P-frames of said enhancement layer with a number of bits equal to the number of bits used for fine prediction in each I/P frames plus a number of bits proportional to a ratio of the number of bits used for fine prediction in each I/P-frames to the summation of total number of bits used for fine prediction for all I/P-frames in said group of pictures and total number of enhancement-layer most significant bits used for fine prediction for all B-frames in said group of pictures, and allocates each B-frame of said enhancement layer with a number of bits proportional to a ratio of the number of enhancement-layer most significant bits used for fine prediction in each B-frame to the summation of total number of bits used for fine prediction for all I/P-frames in said group of pictures and total number of enhancement-layer most significant bits used for fine prediction for all B-frames in said group of pictures.